Tripura Electrical Service

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TR/TES/E-II/DEG/16

Test Booklet Series

B

21.01.2017

TEST BOOKLET

ELECTRICAL ENGINEERING PAPER - II

(Degree)

(Signature of the Candidate)

(Invigilator's Signature)

Time allowed : 3 hours (Three hours) **Maximum Marks : 200**

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY TEST BOOKLET OF SAME SERIES.
2. **ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**
3. This Test Booklet is divided into three sections, i.e **Section-A, Section-B & Section-C.**
   (A) **Section-A (MCQ pattern)** contains 40 items (questions). Each question, carrying 2 (two) marks only, has four responses (answers). You will select the response which you want to mark on the **OMR Sheet.** In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose ONLY ONE response for each item. There shall be no negative marking for wrong/multiple answer.
   (B) Questions under **Section-B (Conventional Method) & Section-C (Conventional Method)** are to be answered in separate **answer book.**
4. You have to mark all your responses of **Section-A by Black Ball Point Pen only** on the separate OMR Answer Sheet provided. See directions in the Answer Sheet.
5. Before you proceed to answer the responses to various items in the Test Booklet, you have to fill in some particulars both in the Answer sheet for Section-A and in the Answer book for Section-B & Section-C.
6. On completion of the examination, you should hand over the OMR Answer Sheet for Section-A & Answer Book for Section-B & C to the Invigilator only. You are permitted to take the Test Booklet with you.
7. Sheets for rough work are appended on the Test Booklet at the end.

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The figures in the margin indicate full marks for the questions.

Symbols have their conventional meaning.

SECTION - A

Answer all questions. Each question carries two marks. Each question has four alternative answers. Select the best alternative and mark on the OMR sheet. 40×2=80

Example : Common emitter transistor has

(A) low current gain and low voltage gain

(B) high current gain and low voltage gain

(C) high current gain and high voltage gain

(D) low current gain and high voltage gain.

1. The hysteresis loop of a material having low retentivity is

(A) wide

(B) narrow

(C) very wide

(D) none of the above

2. The open-circuit test on a transformer is always made on

(A) low-voltage winding

(B) high-voltage winding

(C) either low or high voltage winding

(D) none of the above

3. Which loss in transformer varies significantly with load ?

(A) hysteresis loss

(B) eddy current loss

(C) copper loss

(D) core loss

4. The armature reaction in a d.c. generator can be increased by increasing the

(A) field current

(B) armature current

(C) both field current and armature current

(D) none of the above

5. The speed of a d.c. motor is

(A) always constant

(B) directly proportional to back e.m.f

(C) directly proportional to flux

(D) inversely proportional to the product of back e.m.f and flux

6. An alternator is said to be over excited when it is operating at

(A) unity power factor

(B) leading power factor

(C) lagging power factor

(D) lagging to leading power factor

7. Dampers in a large generator

(A) increase stability

(B) reduce voltage fluctuation

(C) reduce frequency fluctuation

(D) all of the above

8. In synchronous motor out of the following losses, which one will have the highest proportion ?

(A) stator copper losses

(B) friction and windage losses

(C) eddy current losses

(D) iron losses

9. The hunting in a synchronous motor takes place when

(A) friction in bearings is more

(B) airgap is less

(C) load is variable

(D) load is constant

10. The running speed of a three phase induction motor is

(A) synchronous speed

(B) 0.95 × synchronous speed

(C) synchronous speed × (1 - slip)

(D) synchronous speed × slip

11. An induction motor is

(A) self-starting with zero torque

(B) self-starting with high torque

(C) self-starting with smail torque as compared to rated torque

(D) none of these

12. In pumped storage

(A) power is produced by means of pump

(B) water is stored by pumping to high pressure

(C) downstream water is pumped upstream during off load periods

(D) water is recirculated through turbine

13. Advantage of hydroelectric power station is

(A) low operating cost

(B) free from pollution problems

(C) no fuel transportation problems

(D) all of the above

14. Which of the following plants is almost inevitably used as base load plant ?

(A) gas turbine plant

(B) diesel engine plant

(C) pumped storage plant

(D) nuclear power plant

15. Various power system faults in increasing orders of severity are as below :

(A) LG, LL, LLG, LLLG

(B) LLLG, LLG, LG, LL

(C) LLG, LLLG, LL, LG

(D) LL, LG, LLLG, LLG

16. As we add shunt capacitors to a transmission line, its stability

(A) decreases

(B) increases

(C) remains unchanged

(D) may increase or decrease

17. In a circuit breaker, the time duration from the instant of the fault to the extinction of arc is known as

(A) operation time

(B) total clearing time

(C) lag time

(D) lead time

18. In star connected system without neutral grounding, zero sequence currents are

(A) same as peak value of phase current

(B) same as rms value of phase currents

(C) vector sum of phase currents

(D) zero

19. Skin effect depends on

(A) size of the conductor

(B) frequency of the current

(C) resistivity of the conductor material

(D) all of the above

20. Presence of ozone as a result of corona is harmful because

(A) it gives bad odour

(B) it corrodes the material

(C) it transfers energy to the ground

(D) reduces power factor

21. For transmission lines, the standing wave ratio is the ratio of

(A) maximum voltage to minimum voltage

(B) maximum current to minimum voltage

(C) peak voltage to rms voltage

(D) maximum reactance to minimum reactance

22. Resistivity is a property of a semiconductor that depends on

(A) the shape of the semiconductor

(B) the atomic nature of the semiconductor

(C) the shape and atomic nature of the semiconductor

(D) the length of the semiconductor

23. When a P-N junction is biased in the forward direction

(A) only holes in the P region are injected into the N region

(B) only electrons in the N region are injected into the P region

(C) majority carriers in each region are injected into the other region

(D) no carriers move

24. A quiescent state of a transistor implies

(A) zero bias

(B) no output

(C) no distortion

(D) no input signal

25. In case of amplifiers which coupling gives the highest gain ?

(A) transformer coupling

(B) resistance coupling

(C) impedance coupling

(D) capacitance coupling

26. Which class of amplifiers operates with least distortion ?

(A) class A

(B) class B

(C) class C

(D) class D

27. In high frequency region, an amplifier behaves like a

(A) band pass filter

(B) low pass filter

(C) high pass filter

(D) any of the above

28. Which of the following finds applications in speed control of d.c. motor ?

(A) FET

(B) NPN transistor

(C) SCR

(D) none of these

29. A field effect transistor (FET)

(A) uses a high-concentration emitter junction

(B) uses a forward-biased P-N junction

(C) has a very high input resistance

(D) depends on minority-carrier flow

30. The overall gain of a two-stage RC-coupled amplifier is 100. A signal voltage of 10V, 1 kHz is applied across the output terminals of this amplifier. Then, the voltage obtained across the input terminals will be

(A) 0.1V, 1 kHz

(B) 0 V

(C) 100 V, 1 kHz

(D) 10 V, 1 kHz

31. A multivibrator produces

(A) pure sine waves

(B) distorted sine waves

(C) square waves

(D) sawtooth voltages

32. The stack pointer in the 8085 microprocessor is a

(A) 16 bit register which points to stack memory locations

(B) 16 bit accumulator

(C) memory location in the stack

(D) flag register used for the stack

33. What do the contents of program counter specify ?

(A) the address of the instruction being executed

(B) the address of the next instruction to be executed

(C) the address of the instruction executed last

(D) the count of number of instructions executed so far

34. Which of the following interrupts is unmaskable interrupt ?

(A) RST 5.5

(B) RST 7.5

(C) TRAP

(D) INTR

35. The minimum duration of pulse in a pulse triggering system for thyristors should be at least

(A) 10 μs

(B) 10 ms

(C) 30 ms

(D) 1 s

36. RC snubber circuit is used to limit the rate of

(A) rise of current in SCR

(B) rise of voltage across SCR

(C) conduction period

(D) all of the above

37. In a step up chopper circuit, if V_s is the source voltage and α is duty cycle, then the output voltage is

(A) $V_s / (1 + \alpha)$

(B) $V_s (1 + \alpha)$

(C) $V_s (1 - \alpha)$

(D) $V_s / (1 - \alpha)$

38. A free wheeling diode connected across an inductive load is

(A) to restore conduction angle on phase

(B) to avoid negative reversal voltgae drop

(C) to improve the load power factor

(D) all of the above

39. Which of the following modulation system is digital ?

(A) PPM

(B) PCM

(C) PWM

(D) PFM

40. In frequency modulation

(A) noise decreases by increasing frequency deviation

(B) noise decreases by decreasing frequency deviation

(C) noise is unaffected by change of frequency deviation

(D) noise decreases by increasing the bandwidth.

SECTION-B

15×6=90

Answer all questions. Each question carries six marks.

Each answer is to be restricted to 40 words.

1. Introduce briefly different types of d.c. generator.
2. What is armature reaction ?
3. What are the various losses in d.c. motors ?
4. What are the essential conditions for parallel operation of two or more transformers?
5. What are the various starting mechanism in induction motor?
6. Explain the operation of pumped storage plant.
7. What is the function of control rod in nuclear power reactor ?
8. What are the advantages of d.c. transmission ?
9. Define the important parameters of a JFET.
10. What are the advantages of per unit representation with respect to power system ?
11. What is modulation ? List different types of modulation.
12. State the characteristics of an ideal OP AMP.
13. What are the needs and functions of a.c regulator ?
14. What is the purpose of 'stack' in microprocessor programming ?
15. State the Barkhausen criteria for oscillation.

SECTION-C

Answer all questions. Each question carries six marks. 5×6=30

1. A single phase 2200/250V, 50 Hz transformer has a net core area of 36 cm^2 and a maximum flux density of 6 web/m^2. Calculate the number of turns ofr primary and secondary.

2. A chopper circuit is operating on TRC principle at a frequency of 2 KHz on a 220V d.c. supply. If the load voltgae is 170V, computer the conduction and blocking period of thyristor in each cycle.

3. The voltage gain of an amplifier without feedback is 3000. Calculate the voltage gain of the amplifier if negative feedback is introduced in the circuit. Given that feedback fraction = 0.01.

4. A 230V motor has an armature circuit resistance of 0.6Ω. If the full-load armature current is 30A and no load armature current is 4A, find the change in back emf from no load to full-load.

5. A two pole, 50 Hz, 60 MVA turbogenerator has a moment of inertia of 9×10^3 Kg-m^2. Calculate the kinetic energy in MJ at rated speed and the inertia constants M and H.

(Space for rough work)

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